



## **Aerial Photogrammetric Analysis of a Scree Slope and Cliff**

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Mapping the physical features of landslide tracks provides information about factors controlling landslide movement. The increasing availability of unmanned aerial vehicles (UAV) provides the opportunity to efficiently and cost effectively map terrain. The main goal of this field study is to create a streamlined work-flow from acquisition to interpretation for the photogrammetric analysis of landslide tracks. Here an open source software package MicMac is used for ortho-image and point-cloud creation.

A series of two flights were conducted over a scree (rockfall) slope in Kolsas, Norway. The slope runs roughly 500 m north-south with a maximum width of 60 m. A cliff to the west is the source area for the scree. The cliff consists of conglomerate, basalt, and porphyry from bottom to top respectively. The grain size of boulders in the scree slope apparently varies due to lateral differences in the cliff composition. The flights were completed under cloud cover and consisted of multiple lengthwise passes over the scree field. There was a minimum of 75% overlap between images. During the first flight the altitude was roughly 100 m, the camera was positioned normal to the scree (60 degrees from horizontal), and the resolution was 2.7 cm per pixel. The second flight had an altitude of 200 m, the camera orientation was 30 degrees from horizontal, and the resolution was 4.0 cm per pixel. Using the Micmac engine, Ortho-photos and Digital Elevation Models (DEM) were created for both the scree and the cliff. This data will allow for analysis of grain-size, surface roughness, grain-shape, fracture plane orientation, as well as geological mapping. Further work will focus the quantitative assessment of the significance different camera altitudes and angles have on the results. The work-flow used in this study provides a repeatable method for aerial photogrammetric surveys of scree slopes.